Reconfigurable Environment For Analysis and Test of Software Systems (REATSS)

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REATSS Provides Powerful Technologies for Detection of Defects in Safety and Mission Critical Software

ProLogic Incorporated

Professional, Proactive, Proficient, Process-Based

- ***REATSS is an innovative project to incrementally develop and integrate interoperable simulation tools that can be rapidly reconfigured to exercise flight subsystems against a wide range of possible variables as a means of verifying and validating embedded flight software.***

- ***REATSS is an investment in NASA IV&V technical capability and human capital.***

- ***REATSS provides the NASA IV&V Facility with a very powerful and modern technology that will be viewed by program managers as a Value-Added resource to efficiently identify flight software flaws and latent defects that may jeopardize flight safety, performance, and mission success.***

REATSS Enables IV&V Facility to Detect Critical Problem Classes Beyond Static Analyses

- System/Algorithm stability and performance margin
- Race conditions, synchronization
- Interface discordance
- Hardware Sensor/Effector control
- Error/exception handling
- Control/branching logic including state transitions
- Operations at input domain boundaries
- Statistical performance

REATSS Phase 0 Accomplishments

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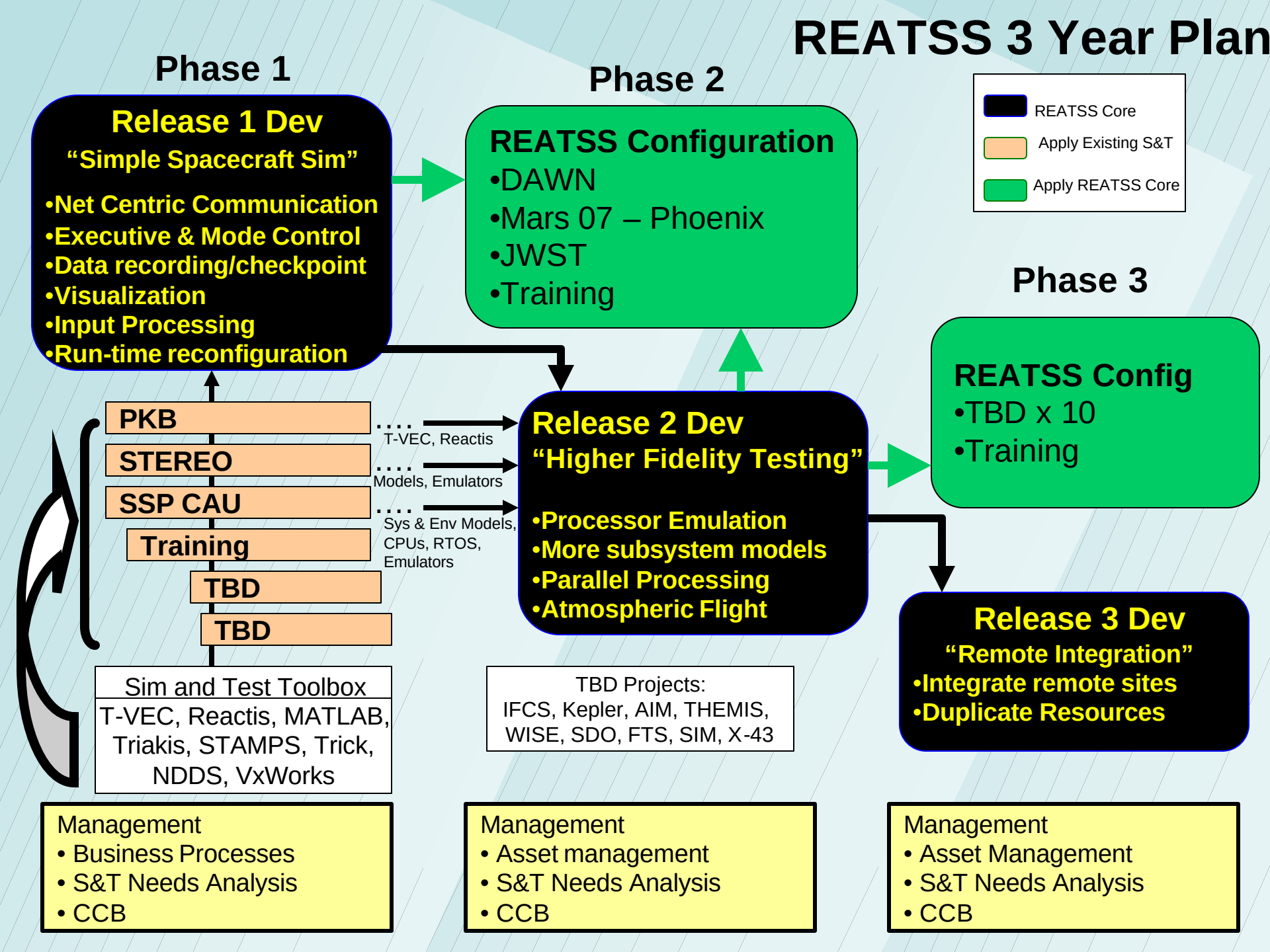
- Hired key subject matter experts (sim, avionics testing, etc.)
- Performed business case analysis
- Performed Project Simulation and Test Needs Analysis for 60+ Projects
  - Top near term candidates - STEREO, Pluto-Kuiper, Shuttle CAU, JWST, Mars 07 Phoenix, DAWN
- Delivered catalog of 40+ Simulation and Test Technologies
- Developed REATSS Roadmap - Concept of operation, architecture, and technology evolution plans
  - Delivered the REATSS Core architectural design
  - Validated REATSS Core design through hands-on evaluations of Key technologies (Trick, NDDS, T-VEC, Reactis, and Triakis)
- Delivered REATSS Implementation Plan
  - Core development & target projects (JWST, Mars 07, DAWN)
  - Apply existing sim and test technologies (STEREO, PKB, CAU)

REATSS 3 Year Plan



Phase 1 Summary

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Task	Results/Benefits
WBS 1 - REATSS Mgt • Implement Business processes • Project Needs analysis • CCB	• Maintain focus on NASA problems • Delivery of value added capabilities as coordinated across NASA and IV&V contractors
WBS 2 - Apply existing S&T technologies • Existing Engineering Sims and Off the Shelf products • User Support and Training	• Increases IV&V Facility S&T skills • Transfer technologies/assets to Core • Reduce errors and increase confidence in NASA systems.
WBS 3 – Develop REATSS • Baseline Technical Architectural Design • Develop First Generation REATSS • Apply REATSS solutions on 1+ projects • Define requirements for Second Generation REATSS	• Establishes capability for use and reuse of S&T components within a 2 to 3 host distributed environment • Reduces risk of second generation distributed REATSS solutions • Reduce errors in NASA software

Select Phase 1 Capabilities

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- WBS 1, REATSS Management
  - Configuration Control Board
- WBS 2, Apply existing S&T technologies
  - 5+ System and/or subsystem simulations that have reuse potential for other space vehicles and the REATSS Core.
  - 15+ members of the IV&V technical staff skilled in the use of advanced simulation based software V&V techniques.
- WBS 3, Develop REATSS Core
  - Functioning spacecraft simulation that employs a state of the art reusable architecture.
  - 6+ members of the IV&V staff skilled in the development of vehicle simulations and test beds, state of the art network centric architectures, and designing systems for reuse.

Phase 1 Application of S&T Technology

- Pluto Kuiper
  - Use MATLAB/Simulink with Reactis and T-VEC testing tools to validate models
    - GN&C and Redundancy Management
- STEREO
  - Employ Triakis standalone PC based ICOSIM and processor emulation to validate Flight Software
- Shuttle Cockpit Avionics Upgrade (CAU)
  - Test CDP and MDU software in hybrid sim/test set
    - Use CDP Power PC hardware on VME backplane running VxWorks
    - Use MDU emulator or PC capable of running VAPS
    - Drive CDP data input through use of STAMPS engineering sim or scripted data sets

Summary

- REATSS positions NASA IV&V for long term success
  - Cost effective state of the art simulation and test capability
  - Human capital investment
- Project has identified Sim and Test technologies that can be applied today and have role in REATSS Core
- Team has evaluated key technologies increasing confidence in the REATSS Core Design
- REATSS team is ready to move forward with Core development and application of Sim and Test technologies